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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,709	02/14/2002	Paul Aimone	06160-1P66	8380

34947 7590 04/11/2003

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 04/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
10/075,709

Applicant(s)
Aimone et al.

Examiner
Rodney McDonald

Art Unit
1753



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

Art Unit: 1753

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 3-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3, line 12, "short" lacks basis for comparison.

Claim 7 is indefinite because "the bonding step is plasma deposition" lacks antecedent basis and is unclear. How is the plasma deposition bonding the powder particles with the deposition?

Claims 15 and 20 are indefinite because a claim cannot be both a product and a method.

Claim 16, line 8, "short" lacks basis for comparison.

Claim 21, line 8, "short" lacks basis for comparison.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

Art Unit: 1753

and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagama et al. (EP 0 834 594).

Nakagama et al. teach a process for producing sputtering targets, which comprises molding a mixture of a powder of a high-melting point substance having a melting point of 900 degrees C or above with a powder of a low-melting metal having a melting point of 700 degrees C or below at a temperature below the melting point of the low-melting metal under heat and pressure. (See Abstract)

The targets obtained according to the present invention can be recycled after use by pressing them together with newly powder of the same composition to compensate for their regional losses from consumption in the same manner as the production and are therefore economically advantageous. (Page 7 lines 6-8)

In the step for bonding a target and a backing plate, a target obtained according to the present invention can be bonded to a backing plate by pressing the target placed on the backing plate in the same manner as in its production without suffering heat of several hundreds degrees C, which is employed in the usual bonding processes. (Page 4 lines 24-25)

Art Unit: 1753

The differences between Nakagama et al. and the present claims is the use of only tantalum as the target material and where the tantalum target is attached to the backing plate for recycling.

Since Nakagama et al. Suggest making a target from a high melting material (i.e. such as tantalum) it would be obvious to select only tantalum for the target material for the production of only a tantalum film.

As to recycling the target material while the tantalum target is attached to the backing plate since the backing plate is required for use in a sputtering apparatus and since it is recognized that the target material can be recycled after use the target must be attached to the backing plate during Nakagama et al.'s suggested recycling process. (See Nakagama et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nakagama et al. by utilizing tantalum as the target material and having the tantalum target attached to the backing plate for recycling because it allows for deposition of a tantalum thin film.

4. Claims 1-6, 8-13 and 15-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wollenberg (DE 199 25 330 A1) in view of Nakagama et al. (EP 0 834 594) and Michaluk et al. (WO 00/31310).

Wollenberg teach a *sputter target* production or *recycling*, using an overhead moving IR source (2) to melt target material on a cast plate (3) or worn target region. (See Abstract)

Art Unit: 1753

A sputter target production or recycling process comprises covering a cast plate (3) or *worn target region pieces with target material pieces* or melt and then *supplying heat from an IR emitter (2) which is passed over the target material (1) to effect complete melting and then solidification of the target material.* (See Abstract; Figures 1 and 2) In Figure 2 *the target 1 is attached to a backing plate 3 with IR emitter 2 supplying the heat to recycle the target material.* (See Figure 2) The IR emitter is believed to encompass IR emitters such as infrared lasers.

The differences between Wollenberg and the present claims is that the target being made of tantalum is not discussed, utilizing metal powder particles to for melting for recycling is not discussed, the particles having the same microstructure is not discussed, removing excess material by machining, sanding or abrasion etching is not discussed, utilizing a laser beam is not discussed, utilizing an electron beam is not discussed, utilizing a vacuum atmosphere is not discussed, utilizing an inert atmosphere is not discussed and utilizing a foil is not discussed.

As to the utilization of a laser beam it is believed that an IR heater encompasses an infrared laser beam heating device. (See Wollenberg above) As to the utilization of a foil since Wollenberg broadly disclose filling the worn target region with metal pieces it is believed that metal pieces such as foils powders, etc would serve the purpose of filling the worn target region during the recycling process. (See Wollenberg et al. discussed above)

Nakagama et al. is discussed above and teach utilizing *powder to recycle targets.* (See Nakagama et al. discussed above) *The powder is the same powder that is utilized in making the*

Art Unit: 1753

target and thus would have a microstructure the same as the initial powder utilized to make the target. (See Nakagama et al. discussed above)

The motivation for utilizing powder to recycling the target is that it is economically advantageous. (Page 7 lines 6-8)

Michaluk et al. teach high purity tantalum metals and alloys. *The high purity tantalum can be utilized as a sputter target.* The high purity tantalum is made from powder and melted to form the sputter target. The high purity tantalum preferably has a fine and uniform microstructure. (See Abstract)

The tantalum powder can be melted a number of ways such as *a vacuum arc remelt* or an *electron beam melting*. (Column 9 lines 4-5) As to the atmospheres involved since Michaluk et al. teach utilizing vacuum during arc melting a vacuum atmosphere would be obvious. As to the inert atmosphere the vacuum atmosphere is believed to read on the inert atmosphere limitation.

With respect to taking this ingot and forming a sputtering target, the follow process can be used. The sputtering target made from the high purity tantalum metal can be made by mechanically or chemically cleaning the surface of the tantalum metal. (Page 10 lines 14-16) *The plate can be mechanically or chemically cleaned again and formed into the sputtering target having any desired dimension. (Page 11 lines 3-4) The mechanically cleaning to form the target into the desired dimension is presumed to encompass machining, sanding or abrasion etching since these are all mechanical shaping processes.*

Art Unit: 1753

The motivation performing the steps of Michaluk et al. is that it allows formation of a high purity target. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Wollenberg by utilizing a powder for recycling and by utilizing powder of the same microstructure as taught by Nakagama et al. and by utilizing a target made of tantalum, by removing excess material for shaping, by utilizing an electron beam for melting, by utilizing a vacuum atmosphere for melting and by utilizing an inert atmosphere for melting as taught by Michaluk et al. because it allows for providing an economic advantage and production of high purity targets.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wollenberg in view of Nakagawa et al. and Michaluk et al. as applied to claims 1-6, 8-13 and 15-24 above, and further in view of Uesawa et al. (Japan 06-158300).

The differences not yet discussed is plasma deposition.

Uesawa et al. teach depositing on a consumed part of a sputter target by plasma CVD utilizing tungsten hexafluoride and hydrogen. (See Abstract)

The motivation for recycling is that it allows for economically produce a target. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was have utilized plasma deposition to recycle targets as taught by Uesawa et al. because it allows for economically producing a target.

Art Unit: 1753

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wollenberg in view of Nakagawa et al. and Michaluk et al. as applied to claims 1-6, 8-13 and 15-24 above, and further in view of Hurwitt et al. (U.S. Pat. 5,126,028).

The differences not yet discussed is burn-in.

Hurwitt et al. teach preparing a target by utilizing a "burn-in" process. (Column 19 lines 18-21)

The motivation for utilizing burn-in is that it prepares the target for a sputtering process. (Column 19 lines 18-21)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a burn-in process as taught by Hurwitt et al. because it allows for preparing a sputter target for a sputtering process.

7. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heindel (DE 19626732 A1) in view of Michaluk et al. (WO 00/31310).

Heindel teach *a sputtering target* made of a metal or alloy which can be melted in air, and which has a liquidus temperature of below 500 degrees C is melted by a heating head (8) to a temperature T_M above T_L and lowering it into the preferably initially solid target material (5, 20) to melt the material in the region of the heating head; and (b) passing the heating head successively through the target material so that the solidification zone (2), formed behind the heating head, travels successively over the entire target region. (See Abstract)

Art Unit: 1753

The recycling process involves filling the eroded target region with target material pieces or melt, and then passing a heating, which is heated to above the target material melting temperature, through the target material to cause successive melting and then solidification to form a homogeneous one-piece target body. (See Abstract)

Figures 1-5 shows the target attached to a backing plate 4 even during recycling. (See Figures 1-4)

The differences between Heindel and the present claims is that the tantalum target is not discussed and where the particles have a similar microstructure.

As to the microstructure the particles utilized are the same as the target pieces melted to recycle the target and therefor are substantially of the same microstructure. (See Heindel Abstract)

Michaluk discussed above teach a tantalum target formed from a powder melt and all is as applies above. (See Michaluk discussed above)

The motivation performing the steps of Michaluk is that it allows formation of a high purity target. (See Abstract)


Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Heindel by as taught by Michaluk because it allows for formation of a high purity target.

Art Unit: 1753

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M-Th from 8 to 5:30. The examiner can also be reached on alternate Nam X. Nguyen.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen, can be reached on (703) 308-3324. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



RODNEY G. MCDONALD
PRIMARY EXAMINER

RM

April 9, 2003